STAFF REPORT

CITY OF ROSEVILLE
DIAMOND CREEK WELL
PHASE II DEMONSTRATION
AQUIFER STORAGE AND RECOVERY PROJECT
PLACER COUNTY

Introduction

The City of Roseville is exploring the possibility of implementing a conjunctive use aquifer storage and recovery (ASR) project, which would involve the injection of treated surface water obtained from Folsom Lake into the groundwater basin underlying Placer County. In preparation for this project, the City completed a Phase I ASR demonstration project in December 2004 and is currently proposing a second phase of the ASR demonstration study to further assess the feasibility of a full-scale project.

Phase I ASR Demonstration Project

The Phase I ASR Demonstration Project, completed under conditional waiver Resolution No. R5-2003-0083, consisted of 26 days of injection at approximately 1,350 gallons per minute (gpm), and approximately 29 days of extraction at approximately 3,400 gpm. The total volume of water injected during Phase I was approximately 158 acre-feet, and the total amount extracted was 439 acre-feet or approximately 278 percent of what was injected.

The Phase I ASR demonstration project was conducted using the Diamond Creek Well located in a park setting, adjacent to the Diamond Creek Elementary School near the intersection of Northgate Drive and Big Bear Drive in Roseville, as shown on Attachment A. Treated water entered the drinking water distribution system at the City's water treatment plant (WTP) and was conveyed approximately 13.2 miles to the Diamond Creek Well. This well is 20-inches in diameter and screened from 310 to 450 feet below ground surface (bgs) in the Merhten formation, which consists primarily of gravelly sand and sandy gravel. Monitoring of the injection/extraction activities was conducted using three existing 4-inch diameter groundwater monitoring wells screened within the same water bearing zone as the Diamond Creek Well.

Following completion of the Phase I project, chloroform at 1.5 micrograms per liter (µg/L), dissolved fluoride at 0.2 milligrams per liter (mg/L), and dissolved organic carbon at 2.3 mg/L were the only constituents that remained in groundwater at concentrations slightly higher than baseline conditions.

The City also developed a numerical model at the end of the Phase I project to estimate the anticipated injection front and capture zones for the Phase II injection, storage and recovery (ISR) cycles. The results of the particle tracking analysis from the groundwater modeling suggests that the aquifer storage zone created by the injection of drinking water is expected to

travel approximately 550 ft upgradient and 829 ft downgradient from the Diamond Creek Well as shown on Attachment A.

Phase II ASR Demonstration Project

The Phase II ASR Demonstration Project will include (a) one month of baseline data collection, (b) injecting 1,094 acre-feet (3.56×10^8 gallons) of treated surface water at a rate of 1,375 gpm into the aquifer over a six month period using the Diamond Creek Well, (c) storage of the injected water in the aquifer for a period of four months, (d) a ten month extraction phase at 2,500 gpm recovering 3,314 acre-feet (1.08×10^9 gallons) of water, and (e) two months of post testing. In an attempt to ensure that any degradation or pollution in the groundwater originating from the project is removed at the end of project, the City has proposed to extract a sufficient volume of water during the final ISR cycle so that the total volume extracted during the entire demonstration project is approximately 300 percent of the total volume injected during the project. A contingency plan is also in place in the event that monitored constituents are identified beyond the storage zone boundary or are present at the end of the final extraction phase of the project.

Water Quality Summary

Samples collected from the City's WTP prior to the Phase I ASR demonstration project, show that chlorine residual, fluoride, chloroform, bromodichloromethane and dichloroacetic acid in the WTP injection water exceed groundwater quality limits. In addition, the City's analytical quantitation limits for dibromochloromethane and NDMAs were greater than the their respective water quality limits. One of five baseline groundwater samples collected from the Diamond Creek Well exceeded the groundwater quality limit for chloroform. Additional groundwater sampling will be completed to clarify baseline conditions.

Constituents	Units	WTP Injection Water Sample	Diamond Creek Well Baseline Groundwater Sample	Ground Water Quality Limit
Chlorine Residual	mg/L	0.36 – 0.9	<0.05	0.002
Fluoride, dissolved	µg/L	300 – 1,100	<100 – 510	1,000
Chloroform	µg/L	34– 43	0.5 – 5.4	1.1
Bromodichloromethane	µg/L	2.2 – 3.1	<0.5	0.27
Dibromochloromethane	µg/L	<0.5	<0.5	0.37
Dicholoracetic acid	µg/L	4.7 - 8.9	<1.0	0.7
N-Nitrosodimethylamine (NDMA)	µg/L	<5.0	<5.0	0.0022

Waiver Conditions

The proposed conditional waiver resolution requires the extraction of 300 percent of the volume of water injected to ensure that the injection plume is captured and removed during the recovery cycle. The waiver also prohibits the creation of a condition of pollution or nuisance, including violation of any groundwater quality objective, beyond the anticipated injection front during each cycle and anywhere in the aquifer at the conclusion of each cycle. If pollution is found at these times, then the City must notify the Regional Board within 24 hours and implement its contingency plan, which will consist of additional groundwater extraction until the monitoring data confirms that the chemical constituents are at concentrations below their respective limits applying groundwater quality objectives. Finally, the Monitoring and Reporting Program (MRP) requires monitoring of treated injection water and the groundwater. The monitoring reports must discuss the water sampling and analytical results associated with the testing, summarize important findings of each testing cycle relevant to the conditions of the waiver, and clearly evaluate and discuss compliance with the conditions of the waiver.

Comment Letters

The tentative waiver resolution was issued for public comment on 8 June 2005 and only one comment letter was received. In summary, Sacramento Suburban Water District (SSWD) stated that they fully support the Phase II ASR demonstration project and recommend that the Regional Board adopt the Resolution waiving WDRs. However, SSWD expressed concerns regarding institutional controls that do not allow groundwater wells to be located within the aquifer storage zone or within an additional 1,000-foot radius of the storage zone during the demonstration project. Preventing other uses and users of groundwater affected by the project is necessary to avoid potential beneficial use impacts. During a full-scale ASR project, such controls would only be required for that portion of the aquifer that fails to meet groundwater quality objectives.

Recommendation

Staff recommends that the Board adopt the Resolution conditionally waiving WDRs for the Diamond Creek Well Phase II ASR Demonstration Project.